

### Patent Claims

1. Compensator for use in a liquid crystal display (LCD) of the bend mode, characterized in that it comprises
  - at least one retardation film having an extraordinary axis substantially parallel to the film plane (A plate),
  - at least one retardation film having an extraordinary axis tilted at an angle  $\theta$  between  $0^\circ$  and  $90^\circ$  relative to the film plane (O plate), and
  - at least one retardation film having an optical axis substantially perpendicular to the film plane and having a refractive index in the direction perpendicular to the film plane that is smaller than the refractive indices in the directions parallel to the film plane (negative C plate).
2. Compensator according to claim 1, characterized in that it comprises two A plates, one negative C plate and one O plate having a tilt angle that varies in a direction perpendicular to the film plane (splayed O plate).
3. Compensator according to claim 1 or 2, characterized in that the A plate and/or O plate and/or C plate comprise polymerised or crosslinked liquid crystal material.
4. Compensator according to at least one of claims 1 to 3, characterized in that the optical retardation of the individual A, O and C plates of the compensator are selected such that the following equations are fulfilled
 
$$d_A \cdot \Delta n_A / d_{LC} \cdot \Delta n_{LC} = 0.115 \pm 0.1$$

$$d_O \cdot \Delta n_O / d_{LC} \cdot \Delta n_{LC} = 0.129 \pm 0.1$$

$$d_C \cdot \Delta n_C / d_{LC} \cdot \Delta n_{LC} = 0.245 \pm 0.2$$

wherein  $d$  is the layer or film thickness,  $\Delta n$  is the birefringence,  $d_A \cdot \Delta n_A$  is the retardation of the A plate,  $d_O \cdot \Delta n_O$  is the retardation

of the O plate,  $d_C \cdot \Delta n_C$  is the retardation of the negative C plate, and  $d_{LC} \cdot \Delta n_{LC}$  is the retardation of the switchable LC cell of the display.

- 5      5.    Compensator according to at least one of claims 1 to 4,  
characterized in that the optical retardation  $d_A \cdot \Delta n_A$  of the A plate  
is from 70 to 110 nm.
- 10      6.    Compensator according to at least one of claims 1 to 5,  
characterized in that is positioned in the display such that one of  
the A plates ('outer A plate') is situated on the side of the  
compensator facing away from the switchable LC cell.
- 15      7.    LCD of the optically compensated bend (OCB) or pi-cell mode,  
characterized in that it comprises at least one compensator  
according to at least one of claims 1 to 6.
- 20      8.    LCD comprising a switchable LC cell with a layer of an LC  
medium having bend alignment and positive dielectric  
anisotropy  $\Delta\epsilon$  between two plane parallel electrodes at least one  
of which is transparent to incident light, and at least one  
polariser or two polarisers sandwiching the LC layer and the  
electrodes, characterized in that it comprises on each side of  
the LC cell at least one compensator according to at least one  
25      of claims 1 to 6.
- 30      9.    LCD according to claim 7 or 8, characterized in that one  
compensator according to at least one of claims 1 to 6 is  
positioned on each side of the switchable LC cell of the LCD  
such that the stack of individual A, O and C plates in both  
compensators is symmetrical with respect to the LC cell.
- 35      10.   LCD according to claim 9, characterized in that the position of  
the individual films in the compensator is selected from the  
following configurations 1) to 12)

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1)	A	-C	← O	A	LC	A	O →	-C	A
2)	A	-C	A	← O	LC	O →	A	-C	A
3)	A	-C	O →	A	LC	A	← O	-C	A
4)	A	-C	A	O →	LC	← O	A	-C	A
5)	A	← O	-C	A	LC	A	-C	O →	A
6)	A	A	-C	← O	LC	O →	-C	A	A
7)	A	O →	-C	A	LC	A	-C	← O	A
8)	A	A	-C	O →	LC	← O	-C	A	A
9)	A	A	← O	-C	LC	-C	O →	A	A
10)	A	← O	A	-C	LC	-C	A	O →	A
11)	A	A	O →	-C	LC	-C	← O	A	A
12)	A	O →	A	-C	LC	-C	A	← O	A

wherein A is a planar A plate, O is a tilted or splayed O plate, -C is a negative C plate, LC is the switchable LC cell of the display, and the arrows denote the direction of increasing tilt angle in a splayed O plate.